P40

Polder to De-polder: an Innovative Sediment Management in Tidal Basin in the Southwestern Bangladesh

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1) Introduction

The southwest (SW) coastal part of Bangladesh shown in **Fig. 1** has been suffering badly from river sedimentation and drainage congestion over the last few decades. Tidal rivers bring large concentrations of sediment from the sea into the river system. Before polderization, major parts of incoming sediment deposited naturally on the low-lying land (*beel*s).

2) From Polder to De-polder

During the period of *Zamindari* or large landowners, the tenant farmers had to pay large portions of their income, to *Zamindar*s. Since the income of *Zamindar*s largely dependent on the crop production, they built low earthen dikes to prevent salinity intrusion and cultivate indigenous varieties rice. After the harvest, the farmers would partially dismantle the temporary embankments to allow flood waters to enter into the previously enclosed areas. The practice of the *ostomasi bundh* or eight-month embankment with 1 harvest per year, was more practice at that time.

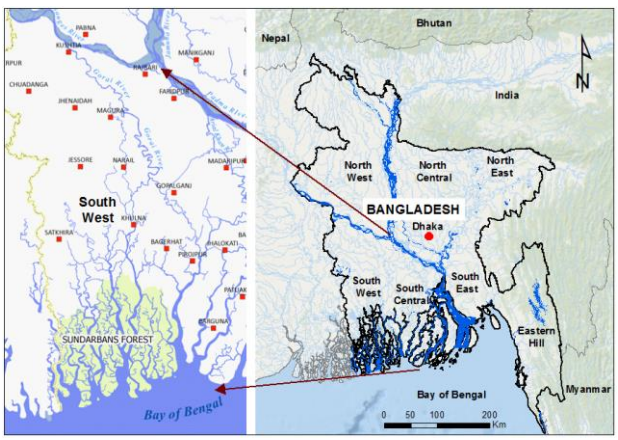

Fig.1 Southwest region of Bangladesh

In the rainy season, farming communities exchanged saline water of their fields with river water when it became almost sweet to minimize the salinity of the land. Thus the environment, ecosystem, and bio-system that evolved in the coastal area were in balance. It was a unique system of land-water interface developed over hundreds of years of practice and experience.

In 1951, the *Zamindar* system was abolished. As a result, there was no one to take the responsibility for repair and maintenance or construction of new ones. Hence the government recognized the need for protection of the coastal area. The construction of series of polders into encircled embankments around depressions keeping the tidal channel outside the polder is the response to the consecutive floods in the 1950s. The polderization started in 1961 to prevent lands from saline intrusion to facilitate increased rice production.

The initial outcomes of the polders were quite rewarding. A significant increase in agricultural productivity for 10 – 15 years was seen. It allowed 2 rice harvests or sometimes even 3 harvests annually compared to 1 earlier. But the obstructions by polder system prevented the spreading of the natural tidal flows and restricted siltation on the *beel*s which led to accelerated silt deposition in the rivers and channels. The deposition on the riverbed for the longer time period left the floodplains inside the polders lower than the riverbanks outside the polders. The subsequent drainage congestion and water logging problem adversely affected the homesteads and livelihood seriously. The sediment management became most challenging.

To address this crucial issue, the Khulna-Jessore Drainage Rehabilitation Project (KJDRP) was formed in the early 1990s. The centerpiece of debate on Polder and De-polder started with an iconic public embankment cutting in *beel* Dakatia. This largest beel in Bangladesh's SW region started to experience severe waterlogging problems by early 80s. In September 1990, during a mass community mobilization (*mahashamabesh*), 4 non-authorized breaches were made by the public in the embankment with the intention of draining away water from the *beel*. Even a substantial increase in land level was observed and the large quantity of water flowed through it, the cuts caused salinity intrusion, which caused crop destruction and human suffering. In 1994, the cuts were again closed by the Bangladesh Water Development Board (BWDB), which caused the *Hamkura* River to sediment up rapidly. The temporary restoration of controlled tidal flooding by de-poldering came to be known conceptually as Tidal River Management (TRM). Although there were some plans for controlled tidal flooding, BWDB did not include the practice.

The additional effect of the devastating flood was added with waterlogging. The water could not be drained away overland, nor could it be discharged. To get rid of the stagnant waterlogging, local people had cut the embankment at *beel* Bhaina in Oct 1997. Rapid drainage and recession of water took place because of a high magnitude of head difference. After few days, the tide started to enter into the *beel* via de-poldered section. The incoming and outgoing tidal flow formed a wider channel which was beyond the capacity of the local people to close it when they wanted.

At the end of the dry season, the local people surprisingly noticed that the land level of *beel* Bhaina had been raised significantly and the depth of *Hari* River had been increased. The local people became interested in this process and urged the KJDRP team to apply the process sequentially in all the low lying *beel*s. Since the *beel* Bhaina was taken up by KJDRP, it is considered as the first TRM officially. In 2002, BWDB incorporated TRM in *beel* Kedaria, then in East *beel* Khuksia in 2006. It showed that, over time, a dominant paradigm suggesting poldering was supplemented by some incidental occasions of de-poldering. Simply, the area has gone through from Polder to De-Polder.

3) De-poldering as innovative sediment management

De-poldering and then controlled flooding in a particular flooding plain is not a new way of sediment management. But TRM involves taking full advantages of the natural tide movement. Tidal basin acts as storage basin which allows natural tidal flows up and down. This silt deposition would occur into the riverbed if it is not utilized for storage. Moreover, the natural flow as low tides to the river benefits in the river declination. In this regards, the system is effective to raise land for cultivation in the *beel* area, improve drainage performance, mitigate the water-logging crisis, and increase the navigability of tidal rivers and revival of river functionality.

This process is a participatory approach where the people of the identified tidal basin have to provide their land for an intended period (a proper compensation should be ensured). The process is continued for several years (the duration depends on the tidal basin's size and the tidal prism). Such basins are rotated among various *beel*s within the system so that farmers of one tidal basin do not have to suffer for a long time, the process known as Tidal Basin Management (TBM).

TBM is a new terminology presented on an ancient practice. The experiences of TBM operated so far, exhibited that there was no drainage congestion and waterlogging problem throughout in the river system and the selected *beel*s were heightened significantly. Temporary de-poldering has started from indigenous practice, which proves technically one of the efficient methods of sediment management.